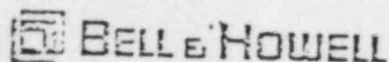


CONSIDER PART OF IDENTIFICATION AND
ACCEPTANCE TEST PROCEDURE

8304220595 830420
PDR ADOCK 05000361
PDR



July 8, 1977

Mr. Jerry Fuller
General Electric
Valley Forge Special Test Center
P.O. Box 8555
Philadelphia, Penn. 19101

Dear Jerry:

Pursuant to your request, enclosed herewith is copy of the D.O.D. and Final Acceptance Test Procedure for the model CEC 1000-04.

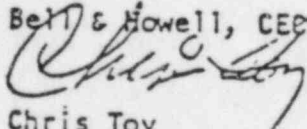
Your order A2800-U67247 specifies procurement of 6 ea Bell & Howell P/N CEC 1000-0173 Pressure Transducers, range 0-100 PSIA. The D.O.D. and ATP being supplied you herewith for the B & H model CEC 1000-04 are totally applicable to the model CEC 1000-0173 with the exception of the identification of your ordered hardware. The disparity in the part numbers was caused by simultaneous receipt of your orders and release of our standard transducer model CEC 1000-04. The proper procedure would be for us to seek a change to your P.O. to reflect the -04 part number, however, there are too many people and companies involved in the project requiring these transducers to change at this point.

We are still targeting a completion date for the first 3 units of 7-14-77 so that the final ATP can be run 7-15-77 as scheduled. I will call you on 7-13-77 and advise our position and probability of completion to schedule.

Please do not hesitate to call should you have questions.

very truly yours,

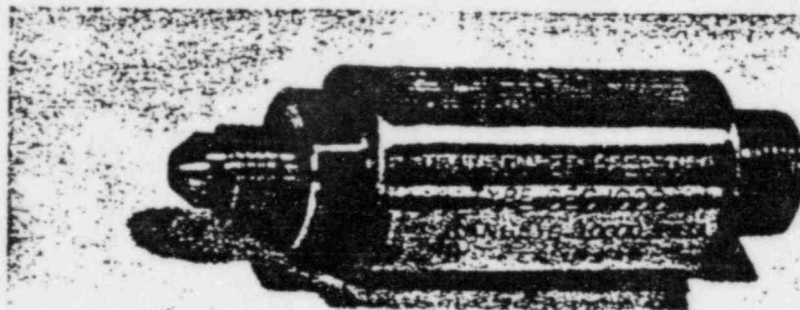
Bell & Howell, CEC Division


Chris Toy
Sr. Product Specialist

Encl: D.O.D., ATP
cc: X-07582

5023-508-17-18-0

CEC[®] 1000-04 Sputtered Thin Film High Temperature Pressure Transducer



- Long-Term Stability
- Highly Reliable
- High Performance
- Advanced Sensor Design
- Rugged Dual Case Isolation

Providing long-term stability and reliability, CEC Sputtered Gage Pressure Transducers are the most accurate thin film transducers available. Performance stability is $\pm 0.1\%$ for extended operation at any combination of constant pressure and temperature within the operating range. The CEC 1000-04 has a compensated temperature range of 75°F to $+400^{\circ}\text{F}$, and an operable temperature range of -65°F to $+450^{\circ}\text{F}$. The thermal errorband performance is typically better than 0.5% within any 50°F temperature band.


Advanced techniques of sputtered film deposition create sensing elements with a maximum combined error for non-linearity, hysteresis, and non-repeatability of $\pm 0.25\%$ of the full range output.

Available in many standard ranges from 15 to 10,000 psi, the CEC 1000 Series also feature an innovative double-case isolation. The basic sputtered sensor is electron beam welded to the pressure chamber/adapter which also provides a high degree of mechanical isolation from mounting torque effects. The sputtered sensor is well isolated from external case effects since the case is welded to the pressure chamber/adapter and not in contact with any portion of the sensor.

CEC Sputtered Gage Pressure Transducers are manufactured in accordance with the program quality requirements of MIL-Q-9858A.

For further information about this pressure transducer, or special application designs, contact the nearest Bell & Howell/CEC Division Sales Office or factory in Pasadena, California.

CEC DIVISION

 **BELL & HOWELL**

S023-506-17-18-0

SPECIFICATIONS

CEC 1000-04 Sputtered Thin Film High Temperature Pressure Transducer

Pressure Rating

Standard Ranges	0 to 15, 25, 50, 100, 250, 500, 1000, 1500, 2000, 2500, 5000 and 10,000 psi absolute.
Proof Pressure	0 to 100 psi and above are available in psis. 200% of rated pressure or 15,000 psi (whichever is less) will not cause changes in performance beyond specified tolerances.
Burst Pressure	300% of rated pressure or 20,000 psi (whichever is less) will not cause rupture of the sensing element or case.

Electrical Characteristics

Excitation:	10 Vdc rated; 15 Vdc maximum.
Full Range Output:	30 mV nominal.
Residual Unbalance:	Within $\pm 5\%$, FRO.
Bridge Resistance:	300 to 500 ohms.
Combined Linearity, Hysteresis and non-repeatability:	$\pm 0.25\%$ FRO, BSL.
Insulation Resistance:	100 megohms or greater at 45 Vdc.
Connections:	6-pin Bendix PC1H-10-6P (101), or equivalent.
Shunt Calibration:	Provisions for single-arm, external shunt calibration.

Mechanical Characteristics

Pressure Chamber Materials:	17-4 PH Stainless Steel.
Pressure Fitting:	7/16-20 male per MS-33656-4, MS-8879 modified per CEC standards.
Weight:	5 oz. maximum excluding mating connector.
Mounting Isolation:	Double case isolation provides assurance that the sensing element will be unaffected by external stresses.
Sensing Element:	4 active-arm bridge using sputtered elements.

Environmental Performance

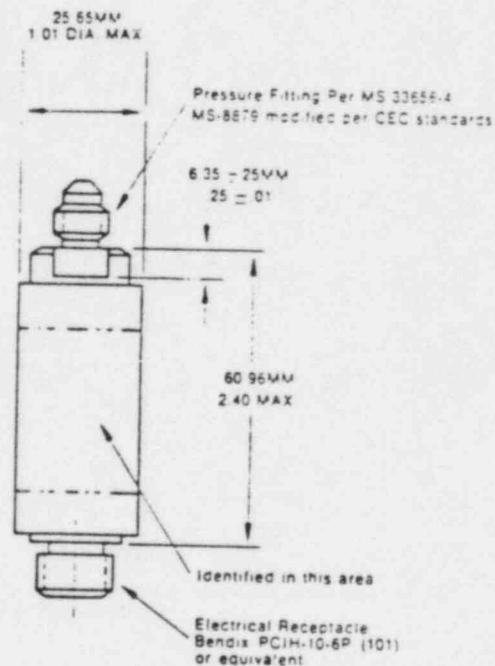
Temperature	
Operating Range:	-65 to $+450^{\circ}\text{F}$.
Compensated Range:	-75 to $+400^{\circ}\text{F}$.
Thermal Zero Shift:	$\pm 0.01\%$ FRO/ $^{\circ}\text{F}$ over the compensated temp. range.
Thermal Sens. Shift:	$\pm 0.01\%$ FRO/ $^{\circ}\text{F}$ over the compensated temp. range.
Thermal Zero Stability:	0.25% FRO over the compensated temp. range.
Thermal Sens. Stability:	0.15% FRO over the compensated temp. range.
Vibration	At 35g peak from 10 to 2000 Hz ($1/2$ " D.A. max.) the output shall not exceed 0.04% FRO/g for 15 psi units decreasing logarithmically to .003% FRO/g for 1000 psi units and above.
Natural Frequency:	50 kHz at 5000 psi, decreasing logarithmically to 5 kHz at 15 psi.
Shock:	100g, 11 msec. half sine wave without damage.
Humidity:	Per MIL-E-5272C, Procedure 1.

Accessories

Included:	Calibration record and dust caps (2).
Optional:	Mating electrical connector Physical Sciences T106-10-6S-C-F1 or equivalent. Specify Bell & Howell PN 170200.


In keeping with Bell & Howell's policy of continuing product improvement, specifications may be changed without notice. If the performance and configuration provided herein for our standard product do not fit your exact needs please check with us regarding customized transducers. Contact us directly at the factory or through your nearest CEC Sales Office.

PIN	FUNCTION
A	— POSITIVE INPUT
B	— POSITIVE OUTPUT
C	— NEGATIVE OUTPUT
D	— NEGATIVE INPUT
E	— SHORTED TO "D"
F	— SHORTED TO "C"

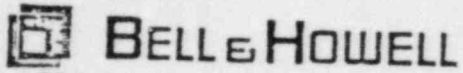


CEC DIVISION

360 Sierra Madre Villa, Pasadena, California 91109

 BELL & HOWELL

CEC DIVISION



CEC Division
360 SIERRA MADRE VILLA
PASADENA, CALIFORNIA 91109
(213) 796-9381

ACCEPTANCE TEST PROCEDURE

FOR

CEC 1000-04

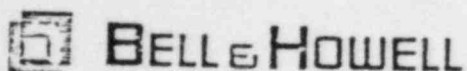
PREPARED BY E. Wong 7-7-77
E. Wong, Sr. Q.A. Engineer

APPROVED BY F. Haag 7/7/77
F. Haag, Project Engineer

APPROVED BY G. Taylor 7-7-77
G. Taylor, Q.A. Manager

DATE: July 7, 1977

S023-508-17-18-0



ACCEPTANCE TEST PROCEDURE FOR CEC 1000-04

1.0 PURPOSE

The purpose of this document is to provide a test procedure to be used by CEC Division to demonstrate that the transducer is in compliance with the product specifications.

2.0 SPECIFICATION

2.1 CEC 1000-04

3.0 TEST EQUIPMENT

- 3.1 Digital Voltmeter, DANA, 5330.
- 3.2 Digital Manometer, CEC 4-462 (For ranges up to 100 PSI).
- 3.3 Deadweight Tester, Amther (For ranges above 100 PSI).
- 3.4 Power Supply, Kepco CK36-1.5M.
- 3.5 Insulation Checker, Weston 799.
- 3.6 Temperature Chamber, Delta Design, MK6300.
- 3.7 Resistance Meter, Dona, 5330.

NOTE: Equipment with equivalent or better accuracy may be substituted.

4.0 GENERAL TEST CONDITIONS

- 4.1 Unless otherwise specified all tests shall be performed under the following conditions:
 - a. Room ambient temperature $77 \pm 10^{\circ}\text{F}$.
 - b. Excitation voltage $10 \pm .002 \text{ VDC}$.
 - c. Atmospheric pressure 28 to 32 inches of mercury.
 - d. Relative humidity 80% or less.

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ACCEPTANCE TEST PROCEDURE FOR CEC 1000-04

5.0 ACCEPTANCE TEST

5.1 Initial room temperature test ($77 \pm 10^{\circ}\text{F}$).5.1.1 Pressure exercise the unit from zero to full scale and back to zero three (3) times. *what is full scale for unit supplied?*5.1.2 Record zero output. *What is rated pressure for unit supplied?*5.1.3 Apply two times rated pressure to the transducer for one minute then release the pressure and record the zero output.

5.1.4 Measure and record the full scale and zero output.

5.1.5 Measure and record the insulation resistance.

5.2 Temperature Test

5.2.1 Repeat 5.1.1, 5.1.4 and 5.1.5 at $400 \pm 10^{\circ}\text{F}$.5.3 Final room temperature test ($77 \pm 2^{\circ}\text{F}$).

5.3.1 Pressure exercise the unit from zero to full scale and back to zero 3 times.

5.3.2 Measure and record the ascending and descending calibration curve from zero to full scale in 20% increments.

5.3.3 Measure and record insulation resistance.

5.3.4 Measure and record input and output resistance.

6.0 SPECIFICATION

6.1 Two times rated pressure shall not cause the zero to shift out of specification.

6.2 Zero output shall be $0 \pm 2\%$ F.S.

6.3 Sensitivity shall be 30mv minimum.

6.4 Thermal zero shift shall not exceed $\pm 0.010\%$ F.S.



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ACCEPTANCE TEST PROCEDURE FOR CEC 1000-04

- 6.5 Thermal zero stability shall not exceed 0.25% F.S.
- 6.6 Thermal sensitivity shift shall not exceed $\pm 0.010\%$ F.S./ $^{\circ}\text{F}$.
- 6.7 Thermal sensitivity stability shall not exceed 0.15% F.S.
- 6.8 Insulation resistance shall be 100 mg ohms minimum at all temperatures.
- 6.9 Combined effects of linearity and hysteresis shall not exceed $\pm 0.25\%$ F.S.
- 6.10 Hysteresis shall be less than 0.10% F.S.
- 6.11 Input and output resistance shall be greater than 300 ohms and less than 500 ohms.